



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

## NOTICE OF ALLOWANCE AND FEE(S) DUE

23552 7590 09/18/2009

MERCHANT & GOULD PC  
P.O. BOX 2903  
MINNEAPOLIS, MN 55402-0903

EXAMINER

JAMA, ISAAK R

ART UNIT

PAPER NUMBER

2617

DATE MAILED: 09/18/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,261	04/05/2007	Tao Duan	14556.0003USWO	7771

TITLE OF INVENTION: METHOD AND APPARATUS FOR REPEATING WIRELESS SIGNALS BIDIRECTIONALLY AND SYNCHRONOUSLY

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	12/18/2009

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

## PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail Stop ISSUE FEE**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23552 7590 09/18/2009

**MERCHANT & GOULD PC**  
**P.O. BOX 2903**  
**MINNEAPOLIS, MN 55402-0903**

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

### Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the **Mail Stop ISSUE FEE** address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,261	04/05/2007	Tao Duan	14556.0003USWO	7771

TITLE OF INVENTION: METHOD AND APPARATUS FOR REPEATING WIRELESS SIGNALS BIDIRECTIONALLY AND SYNCHRONOUSLY

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	12/18/2009
EXAMINER	ART UNIT	CLASS-SUBCLASS				
JAMA, ISAAK R		2617	370-321000			

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,  
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

4a. The following fee(s) are submitted:

Issue Fee  
 Publication Fee (No small entity discount permitted)  
 Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

A check is enclosed.  
 Payment by credit card. Form PTO-2038 is attached.  
 The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.  
 b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,261	04/05/2007	Tao Duan	14556.0003USWO	7771
23552	7590	09/18/2009	EXAMINER	
MERCHANT & GOULD PC P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903				JAMA, ISAAK R
ART UNIT		PAPER NUMBER		
2617				DATE MAILED: 09/18/2009

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 323 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 323 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/565,261	DUAN, TAO
	<b>Examiner</b>	<b>Art Unit</b>
	ISAAK R. JAMA	2617

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to 08/26/2009.
2.  The allowed claim(s) is/are 1-6,9-12, 14 and 16-21 and the claims were renumbered 1-17 respectively.
3.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a)  All
  - b)  Some\*
  - c)  None
 of the:
  1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4.  A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a)  including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1)  hereto or 2)  to Paper No./Mail Date \_\_\_\_\_.
  - (b)  including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1.  Notice of References Cited (PTO-892)
2.  Notice of Draftsperson's Patent Drawing Review (PTO-948)
3.  Information Disclosure Statements (PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4.  Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5.  Notice of Informal Patent Application
6.  Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_.
7.  Examiner's Amendment/Comment
8.  Examiner's Statement of Reasons for Allowance
9.  Other \_\_\_\_\_.

/Lester Kincaid/  
Supervisory Patent Examiner, Art Unit 2617

### **DETAILED ACTION**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Tong Wu on 09/11/2009.

Claim 9 (Currently amended) The method as claimed in claim [[8]] 1, wherein said active state of the uplink and downlink RF amplification control signals are indicated by a high level, and said inactive state by a low level.

Claim 10 (Currently amended) [[A]] The method as claimed in claim [[8]] 1, wherein, in step C, said control closing the downlink channel when the uplink channel is open performs as follows:

firstly, the downlink RF amplification control signal (PA\_EN1) switched into inactive state allows the downlink of power amplification to be close, then the uplink channel is opened and the downlink channel is closed by the receive and transmit control signal (SW), and finally the uplink RF amplification control signal (PA\_EN2) switched into active state enables the uplink of the power amplification; and said control closing the uplink channel when the downlink channel is open performs as the following: firstly, the uplink RF amplification control signal (PA\_EN2) switched into inactive state allow the uplink of the power amplification to be closed, then the downlink channel is opened and the uplink channel is closed by the receive and transmit control signal

(SW), and the finally downlink RF amplification control signal (PA\_EN~I) which is switched into active state enables the downlink of power amplification.

***Allowable Subject Matter***

1. Claims 1-6, 9-12, 14, 16-21 are allowed.
2. The prior art made of record and relied upon by the Examiner fails to teach or even suggest "a method for repeating wireless signals bidirectionally and synchronously, which is applied to a TDD wireless communication system comprising a base station and a terminal device, wherein said method comprises:
  - step A: obtaining synchronization information of said system from wireless signals emitted from said base station;
  - step B: generating reference control signals accurately synchronized with the base station according to the obtained system synchronization information and the system time slot configuration information;
  - step C: processing said reference control signals accurately synchronized with the base station respectively to generate a plurality of time sequential control signals to control the uplink RF amplification, the downlink RF amplification and the receiving and transmission respectively, thereby controlling the downlink channel to be closed when uplink channel is open and the uplink channel to be closed when the downlink channel is open, so as to repeat signals emitted from the uplink/downlink channel between said base station and terminal devices bidirectionally and synchronously; wherein said sequential control signals described in step C are obtained by logically converting and

delaying said reference control signals accurately synchronized with the base station; said logical conversion and delay indicate concretely: delaying the downlink RF amplification control signals, the uplink RF amplification control signals, and the receive-and transmit control signals respectively, so that: when switching from the downlink enable to the uplink enable, the downlink RF amplification control signal (PA EN1) is firstly switched into an inactive state, then the receive and transmit control signal (SW) is switched to allow the uplink channel to be open, and finally the uplink RF amplification control signal (PA\_EN2) is switched into an active state; and when switching from the uplink enable to the downlink enable, the uplink RF amplification control signal (PA EN2) is firstly switched into an inactive state, then the receive and transmit control signal (SW) is switched to allow the downlink channel to be open, and finally the downlink RF amplification control signal (PA EN1) is switched into active state" as recited independent claim 1.

2. Claims 2-6 and 9-10 depend on allowed base claim, hence, these claims are also allowed.

3. In addition, the prior art made of record and relied upon by the Examiner fails to teach or even suggest the following: "An apparatus for repeating wireless signals bidirectionally and synchronously, wherein, said apparatus comprises: a receiving antenna for base station signals, a receiving antenna for terminal device signals, a frequency selection and bidirection RF amplification circuit, and a synchronization extraction and control device, wherein, the synchronization extraction and control device receives wireless signals emitted from the base station by the receiving antenna for

base station signals, generates sequential control signals by using these wireless signals and the system time slot configuration information, and transmits the sequential control signals to the frequency selection and bidirection RF amplification circuit; and the frequency selection and bidirection RF amplification circuit receives wireless signals emitted from the base station by the receiving antenna for base station signals, opens the downlink channel while closes the uplink channel, amplifies and filters these wireless signals according to the sequential control signals transmitted from the synchronization extraction and control device, then repeats the amplified wireless signals to terminal devices by the receiving antenna for terminal devices signals; receives wireless signals emitted from terminal devices by the receiving antenna for terminal device signals, opens the uplink channel while closing the downlink channel, amplifies and filters these wireless signals according to the sequential control signals transmitted from the synchronization extraction and control device, and then repeats the amplified wireless signals to the base station by the receiving antenna for base station signals; wherein said frequency selection and bidirection RF amplification circuit comprises: a first filter, a second filter, a first: receive and transmit switch, a second receive and transmit switch, a power amplification device for uplink signals, and a power amplification device for downlink signals

4. said first and second receive and transmit switch being used for opening the uplink channel and closing the downlink channel or for opening the downlink channel and closing the uplink channel under the control of the sequential control signals, the power amplification device for uplink signals and the power amplification device for

downlink signals being in on state and in off state respectively under the control of the sequential control signals when the uplink channel is opened, and the power amplification device for uplink signals and the power amplification device for downlink signals being in off state and in on state respectively under the control of the sequential control signals when the downlink channel is opened, wherein, for the uplink channel: a wireless signal emitted from terminal devices and received by the receiving antenna for terminal device signals is filtered by the second filter, then transmitted to the power amplification device for downlink signals through the second receive and transmit switch and amplified, the amplified wireless signal is transmitted to the first filter through the first receive and transmit switch and filtered, next the amplified wireless signal after being filtered is transmitted from the first filter to the receiving antenna for base station signals and emitted to the base station by means of the receiving antenna for base station signals; and for the downlink channel: a wireless signal emitted from the base station and received by the receiving antenna for base station signals is filtered by the first filter, then transmitted to the power amplification device for uplink signals through the first receive and transmit switch and amplified; the amplified wireless signal is transmitted to the second filter through the second receive and transmit switch and filtered; the second filter transmits the amplified wireless signal after being filtered to terminal devices by means of the receiving antenna for terminal device signals; said downlink power amplification device comprises: a first to fourth power amplifier, a first converter, a second converter, a first SAW filter, and a first variable gain regulator, wherein, a signal emitted from the base station is transmitted to the input terminal of the

first power amplifier through the first receive and transmit switch, then amplified by the first power amplifier, and next down-converted to IF signals by the first converter; after being amplified by the second amplifier, IF filtered in the first SAW filter, level- regulated by the first variable gain regulator, amplified by the third amplifier, up-converted to RF signals by the second converter, and amplified by the fourth amplifier, the signal emitted from this base station reach a predetermined level and then transmitted through the second receive and transmit switch; and said uplink power amplification device comprises: a fifth to eighth power amplifier, a third converter, a fourth converter, a second SAW filter, and a second variable gain regulator, wherein a signal emitted from terminal devices is transmitted to the input terminal of the fifth power amplifier through the second receive and transmit switch, then amplified by this power amplifier, and next down-converted to IF signals by the third converter; after being amplified by the sixth amplifier, IF filtered in the second SAW filter, level-regulated by the second variable gain regulator, amplified by the seventh amplifier, up-converted to RF signals by the fourth converter, and amplified by the eighth amplifier, the signal emitted from the terminal devices reaches a predetermined level and then transmitted through the first receive and transmit switch" recited in independent claim 11.

5. Claims 12, 14, 16-21 depend on allowed base claim 11, hence, these claims are also allowed.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ISAAK R. JAMA whose telephone number is (571)270-5887. The examiner can normally be reached on 7:30 - 5:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester G. Kincaid can be reached on (571) 272-7922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/IRJ/